Proposed Agreement between California Energy Commission and Geysers Power Company, LLC

Title: Caldwell Ranch Exploration and Confirmation Project
Amount: $410,000.00
Term: 26 months
Contact: John Hingtgen
Committee Meeting: 9/1/2010

Funding

FY	Program	Area	Initiative	Budget	This Project	Remaining Balance	
09	Electric	Renewables	ARRA	$2,179,611	$249,950	$205,000	9%
10	Electric	Renewables	ARRA	$2,179,611	$160,050	$294,900	14%

Recommendation

Approve this agreement with Geysers Power Company, LLC for a two year, $410,000 cost share grant to to conduct exploration, reservoir modeling, and re-drilling of existing abandoned well in the Caldwell Ranch area in the northwest Geysers. This well is one a group of three wells in Calpine's work program. Work on the first two wells is underway now, and the grant would provide funding toward the third well. The purpose of this work is to confirm what is expected to be a 22-45 MW resource in a presently underexploited area of The Geysers. This grant supplements the recipient's American Recovery and Reinvestment Act of 2009 (ARRA) award. Under the Department of Energy's Geothermal Technologies Program DE-FOA-0000109, Calpine was awarded $5,000,000 in Department of Energy (DOE) American Reinvestment Recovery Act (ARRA) funds and is providing $5,390,000 in additional match funding The total budget for the project is $10,800,000. Staff recommends approving this agreement on the consent calendar.

Issue

The Geysers, located along the border of Lake and Sonoma Counties, is the world's largest-producing geothermal field. Calpine currently owns and operates 15 geothermal plants producing approximately 725 megawatts (MW). This represents about 25 percent of California's total renewable energy production. Production at The Geysers peaked in the mid 1990s and began to decline due to dropping reservoir pressure. However, agreements with the City of Santa Rosa and the County of Lake allowed Calpine and another Geysers operator, Northern California Power Agency (NCPA), to inject wastewater into the reservoir, rebuilding some of the pressure and recharging the reservoir. While geothermal operators commonly reinject spent waters from their power plants back into the reservoir, the large-scale recharge currently going on at The Geysers using water from outside sources is a demonstration of the feasibility of reservoir recharge or enhancement in what could be considered an Enhanced Geothermal System (EGS).

The Caldwell Ranch Project area comprises 870 acres located near the northern portion of The Geysers. It was developed in 1988-89 as the steam field for the 130 MW Central California Power Agency (CCPA) NO 1 project, and supplied steam to the CCPA No 1 plant until 1996. Severe reservoir pressure declines, insufficient water supply, and falling energy prices, the power plant was shut down in July 1996, and was abandoned along with the wells, pipelines, and leases in 2000. Calpine acquired the Caldwell Ranch leases in 2004. Calpine's subsequent research and exploration activities indicate that the area remains a promising resource capable of supplying up to 45 MW of steam to an existing electrical generator operated by Calpine. In 2007, the Santa Rosa Geysers Recharge Pipeline was extended across the project area, and Calpine entered into a contract with the City of Santa Rosa to deliver new injection water to supply the proposed redevelopment. Other infrastructure including well pads and transmission access is already in place.

Calpine intends to work over (re-drill) three existing wells to explore and confirm the reservoir potential in the area. The Caldwell Ranch project work will include innovative exploration technologies applicable to all hydrothermal fields, and will couple the exploration with a geologic reservoir model now under development in collaboration with Lawrence Berkeley National Laboratory. The reservoir model includes new numerical methods to model geothermal reservoirs in low permeability rocks. If successful, this project will lead to the development of additional geothermal baseload renewable energy in California and will help demonstrate the viability of enhancement in a geothermal reservoir where there is sufficient temperature to generate steam but limited permeability for fluid flow without added injection. This project is part of a wider-scope exploration and enhancement plan for underexploited resources in The Geysers.

Background

Federal Funding

Under the provisions of the American Recovery and Reinvestment Act of 2009 (ARRA) and the Department of Energy's Geothermal Technologies Program DE-FOA-00000109, Calpine was awarded $5,000,000 to explore, model, and confirm a geothermal resource in the Caldwell Ranch area of The Geysers. The total budget for the project is $10,800,000. This total includes $5,390,000 that Calpine must provide to meet the cost share requirement set by the DOE. The DOE award to Calpine will be established as a cooperative agreement with a two-year performance period.

CEC Cost Share

Calpine submitted an application to PIER for cost share funding under PON-08-011 for their ARRA DE-FOA-00000109 project and was issued a CEC Letter of Intent to provide cost share in the amount of $410,000 in accordance with the terms of PON-08-011. DOE did not fund Calpine's proposal during their first round of review, but the proposal was later funded from the alternate list.

Proposed Work

This project is for the re-opening and deepening of one well of a group of three an abandoned well in the Caldwell Ranch area, near The Geysers, Sonoma County, California. Calpine requests funding to "unabandon" (re-open, re-drill, and deepen) the three wells to characterize reservoir conditions and

explore the feasibility of re-developing an economically viable resource. The results from reopening the wells can lead to expansion of this geothermal area. The 870-acre Caldwell Ranch project area is north of, and adjacent to, Calpine's existing Eagle Rock (Unit 11) and Ridge Line (Units 7 & 8) steamfields and power plants. Each of the wells to be worked over is expected to be capable of producing 2.5 MW of electricity. With additional wells, in the long run, Calpine expects that the Caldwell Ranch area has the potential of generating 22-45 MW of electricity. This expectation is based on the average productivity of the existing Unit 11 and Units 7 and 8 steamfields and on Calpine's research.

State of the art site characterization techniques will be used to confirm the presence and characteristics of the Caldwell reservoir and enable the re-development of a steamfield and large-diameter steam gathering pipeline system. The innovative combination of well and reservoir characterization techniques to be used in the Caldwell Ranch Exploration and Confirmation Project include: isotopic analysis of reservoir rock, downhole geochemical sampling in conjunction with a high temperature pressure-temperature-spinner (PTS) log, noble gas isotope collection and analysis, and reservoir-scale fracture analyses using microearthquake data. These techniques will be coupled with a new geologic reservoir model, developed in collaboration with Lawrence Berkeley National Laboratory that shows reservoir boundaries and uses new information of fluid and rock geochemistry, isotope, and geologic relationships.

The proposed overall activities comprise three phases: (1) evaluating the resource through compilation all extant data related to the Caldwell Ranch area, preparing a re-drilling project analysis, and providing an integrated reservoir model; (2) re-drilling and completing the three wells; and (3) well testing to determine the deliverability, permeability, and static pressure of the steam reservoir. An independent expert hired by DOE will witness the testing .

The Energy Commission cost share will be distributed among all of the activities described above.

The team includes geologists and engineers from Calpine (a private sector California based company), personnel from Hudson Mechanical; Air Comp, LLC and Kenai Drilling (or another contracted drilling company). Results from the project will be communicated to interested parties and organizations through progress reports, technical papers, and presentations, and reports submitted for the National Geothermal Data System.

Justification and Goals

This project "[will] advance energy science or technologies of value to California citizens..." (Public Resources Code 25620. (c)), and is part of a "full range of research, development, and demonstration activities that . . . are not adequately provided for by competitive and regulated markets (Public Resources Code 25620.1. (a)).

If Calpine is successful in demonstrating the Caldwell Ranch area's geothermal resource through this effort, this project has the potential to yield an additional 22-45 MW of baseload, renewable geothermal energy being generated in a currently underexploited area in The Geysers, and would aid in the understanding and potential further development of other, nearby underexploited or unexploited areas in The Geysers. Calpine's additional regional, coordinated plans, which consist of a $200 million program to modify power plant and steamfield equipment, and to expand steam production and water injection to support electric generation at The Geysers, will be furthered by the success of the Caldwell Ranch

project. Ultimately Calpine hopes to add up to 189-357 MW of new generation over the next 5 years. They are proposing seven exploration and confirmation projects to further define the boundaries of the reservoir. This project is part of that overall plan.

The project is consistent with the 2005 Energy Action Plan II, which states that a key action for reaching California's Renewable Portfolio Standard is to monitor and support existing renewable resources.

This will be accomplished by a demonstration of a viable geothermal resource in the Caldwell Ranch area, and if such demonstration is successful, the construction of a large-diameter pipeline to supply steam to an existing power plant (unit 11) increasing its electricity generating capacity.